Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. A counter current mixing reactor for continuously mixing two or more fluids of differing densities comprising a first inlet and an outlet characterized in that one or more further inlets are diametrically opposed to said first inlet and are disposed within said outlet, wherein at lease one of said fluids is in the subcritical, near critical or supercritical state.

2. A mixing reactor as defined in claim 1 comprising a first inlet and an outlet characterized in that a further inlet is diametrically opposed to said first inlet and is disposed within said outlet.

3. A mixing reactor as defined in claim 1 arranged in a vertical configuration.

4. A mixing reactor as defined in claim 1 wherein at least one of said fluids is heated, pressurized or supercritical water.

5. A mixing reactor as defined in claim 1 wherein at least one of said fluids is an aqueous solution of a metal salt or compound wherein said metal is selected from transition metals including ruthenium, cadmium, rhodium, palladium, iron, cerium, titanium, zirconium, copper and silver.

6. A mixing reactor as defined in claim 1 wherein said fluid of higher density is cooler than said fluid of lower density.

7. A mixing reactor as defined in claim 1 wherein said one or more further inlets comprise a shaped nozzle, for example, a conical funnel.

8. A process for preparing metal or metal oxide nano-particles which comprises delivery of a metal salt solution through a first inlet of a mixing reactor as defined in claim 1 and delivery of a fluid in the subcritical, near critical or supercritical state through a further inlet

diametrically opposed to said first inlet wherein said further inlet is disposed within an outlet such that the mixed solutions exit said reactor once mixed.

9. A process as defined in claim 8 wherein said metal salt solution is cooled prior to mixing.

10. Metal or metal oxide nano-particles obtainable by a process as defined in claim 8.

11. A device capable of mixing two fluids of differing densities having a downwardly facing outlet for less dense fluid and inlet for more dense fluid adapted to cause an upwards flow of said more dense fluid in use, the arrangement being such that said less dense fluid is introduceable into the device in a downwards orientation relative to the upwards flow of said denser fluid.

12. A device as specified in claim 11, characterized by said inlet of said less dense fluid having a conical nozzle to aid mixing of said fluids.

13. A device specified in claim 11, in which the denser of said two solutions is cooled prior to entry into said reactor.

14. A method of mixing two fluids of different densities, comprising:

providing a device with a downwardly facing outlet for processing flow of less dense fluid;

further providing an inlet for processing flow of a more dense fluid and the device causing an upward flow of said more dense fluid; and

introducing said less dense fluid into the device in a downwards orientation relative to the upwards flow of said more dense fluid, the less dense fluid and the more dense fluid being mixed within the device.

15. The method of claim 14 wherein one of said fluids is at least one of near critical and supercritical water.

16. The method of claim 14 wherein the step of mixing produces a nano-particulate cerium oxide.

17. The method of claim 14 wherein the step of mixing produces a nano-particulate titanium oxide.

18. The method of claim 14 wherein the step of mixing produces a nano-particulate zirconium oxide.

19. The method as defined in claim 14 wherein the step of mixing produces a nano-particulate copper oxide.

20. The method as defined in claim 14 wherein the step of mixing produces a nano-particulate silver oxide.

21. The method as defined in claim 14 wherein the step of mixing produces mixed metal oxides.